

**EXACT ENGLISH LANGUAGE
TRANSLATION OF THE ANNEXES
TO THE INTERNATIONAL
PRELIMINARY REPORT ON
PATENTABILITY WITH ANNEXES
CONTAINING PAGES 2-2a TO BE
SUBSTITUTED FOR PAGE
2 AND CLAIMS 1-38 TO BE
SUBSTITUTED FOR ORIGINAL
CLAIMS 1-38 FOR
EXAMINATION IN THIS CASE**

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5 can also be determined, a phosphate solution, rather than the ammonium oxalate solution, being presented to the urine sample until it crystallises and the ratio of free calcium ions and phosphate solution being determined as the risk indicator.

A measuring device for examining a liquid sample by titration is known from WO 02/063285.

10 WO 91/16618 A1 describes a measuring head for a titration measurement apparatus.

As regards the method developed at the Bonn University and mentioned at the outset, reference should be made to the scientific paper entitled, "Comparison of laser-probe and photometric determination of the urinary crystallisation risk of calcium oxalate", in Clinical
15 Chemistry and Laboratory Medicine, vol. 40, no. 6, pages 595f., June 2002.

JP 2000/266668 describes a measuring head for reaction monitoring.

JP 11014632 describes a fibre sensor for liquid level determination.

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Reference should also be made to the scientific paper entitled, "Laser-probe-based investigation of the evolution of particle sized distributions of calcium oxalate particles formed in artificial urine", in Journal of Crystal Growth, vol. 233, no. 1 – 2, pages 367f.

25 The object of the invention is to provide an apparatus and a method for examining liquid samples with which, in particular, the above-described method of examination of a urine sample for determining the Bonn risk index may be carried out cost-effectively and reliably in a medical practice or in a hospital. The apparatus should enable the method to be carried out in a standard, substantially automated manner and at low cost.

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AMENDED SHEET

According to the invention, the object is attained by an apparatus comprising the features of claims 1, by a method with the features of claims 30 and 31, and by a measuring head for use in an apparatus of the generic type comprising the features of claim 38.

5 The inventors have found that a titration system may be used in conjunction with optical transition measurement to determine the crystallisation point of a liquid sample. However, the measuring arrangement for transmission measurement could not, in turn, necessitate the exclusive use of sample vessels for the liquid sample, in particular for a urine sample, of high optical quality. The inventors have concluded from this that although a portion of the
10 liquid sample is to be investigated thoroughly with a light ray for transmission measurement, it is, on the other hand, disadvantageous to pass rays through the sample vessel itself.

According to the invention, therefore, the apparatus comprises a measuring head which
15 comprises an optical fibre and may be immersed into a liquid sample to be measured. A first end of the optical fibre is allocated to a light source. A light sensor is arranged in a defined manner relative to the light path, predetermined by the optical fibre, of the light emitted from the light source. In the immersed region of the measuring head there is further provided a recess which further interrupts the optical fibre in such a way that at least a
20 portion of the light guided by the optical fibre thoroughly examines the liquid sample over a defined distance. Clouding of the liquid to be examined, which is due to the initiation of crystallisation during the defined addition of a titration liquid to the liquid sample by a titration system of the measuring apparatus may then be detected by the light sensor on the basis of the increasing losses of transmission.

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